# SCS210AJ

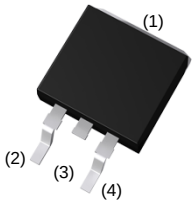
**SiC Schottky Barrier Diode**

Datasheet

| | |
|---|---|
| $V_R$ | 650V |
| $I_F$ | 10A |
| $Q_C$ | 15nC |

**●Outline**

**LPT(L)**
**<TO-263AB>**



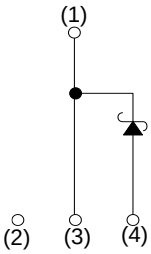

**●Features**

1) Shorter recovery time

2) Reduced temperature dependence

3) High-speed switching possible

**●Inner circuit**




(1) Cathode
(2) N / C
(3) Cathode
(4) Anode

**●Applications**

- PFC Boost Topology
- Secondary Side Rectification
- Data Center
- PV Power Conditioners

**●Packaging specifications**

| | | |
|---|---|---|
| Type | Packaging | Embossed tape |
| | Reel size (mm) | 330 |
| | Tape width (mm) | 24 |
| | Basic ordering unit (pcs) | 1000 |
| | Packing code | TLL |
| | Marking | SCS210AJ |

**●Absolute maximum ratings** ($T_{vj}$ = 25°C unless otherwise specified)

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Reverse voltage (repetitive peak) | | $V_{RM}$ | 650 | V |
| Reverse voltage (DC) | | $V_R$ | 650 | V |
| Continuous forward current | ($T_c$= 137°C) | $I_F$ | 10 *1 | A |
| Surge non-repetitive forward current | PW=10ms sinusoidal, $T_{vj}$=25°C | $I_{FSM}$ | 38 | A |
| | PW=10ms sinusoidal, $T_{vj}$=150°C | | 30 | A |
| | PW=10μs square, $T_{vj}$=25°C | | 150 | A |
| Repetitive peak forward current | | $I_{FRM}$ | 45 *2 | A |
| $i^2t$ value | PW=10ms, $T_{vj}$=25°C | $\int i^2dt$ | 7.2 | $A^2s$ |
| | PW=10ms, $T_{vj}$=150°C | | 4.5 | $A^2s$ |
| Total power dissipation | | $P_D$ | 83 *3 | W |
| Virtual Junction temperature | | $T_{vj}$ | 175 | °C |
| Range of storage temperature | | $T_{stg}$ | −55 to +175 | °C |

*1 Limited by maximum $T_{vj}$ and for Max. $R_{thJC}$.

*2 $T_c$=100°C, $T_{vj}$=150°C, Duty cycle=10%  *3 $T_c$=25°C


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## ●Electrical characteristics ($T_{vj}$ = 25°C unless otherwise specified)

| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| DC blocking voltage | $V_{DC}$ | $I_R$ =2.0mA | 650 | - | - | V |
| Forward voltage | $V_F$ | $I_F$=10A,$T_{vj}$=25°C | - | 1.35 | 1.55 | V |
| | | $I_F$=10A,$T_{vj}$=150°C | - | 1.55 | - | V |
| | | $I_F$=10A,$T_{vj}$=175°C | - | 1.63 | - | V |
| Reverse current | $I_R$ | $V_R$=600V,$T_{vj}$=25°C | - | 2 | 200 | μA |
| | | $V_R$=600V,$T_{vj}$=150°C | - | 30 | - | μA |
| | | $V_R$=600V,$T_{vj}$=175°C | - | 70 | - | μA |
| Total capacitance | C | $V_R$=1V,f=1MHz | - | 360 | - | pF |
| | | $V_R$=600V,f=1MHz | - | 37 | - | pF |
| Total capacitive charge | $Q_C$ | $V_R$=400V,di/dt=350A/μs | - | 15 | - | nC |
| Switching time | $t_C$ | $V_R$=400V,di/dt=350A/μs | - | 15 | - | ns |

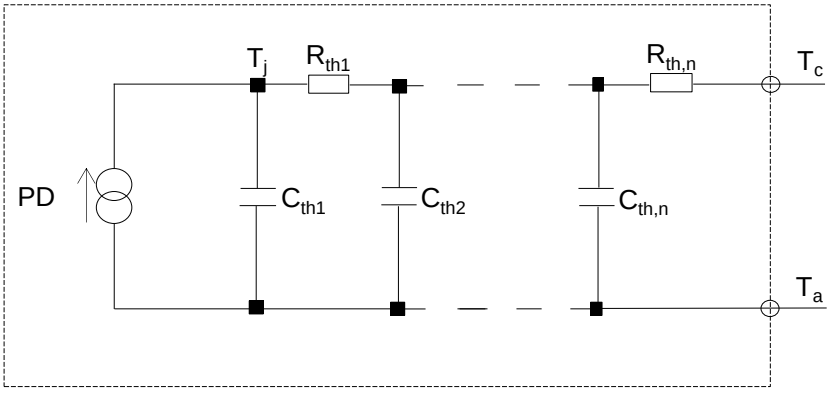
## ●Thermal characteristics

| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Thermal resistance | $R_{th(j-c)}$ | - | - | 1.5 | 1.8 | K/W |

## ●Typical Transient Thermal Characteristics

| Symbol | Value | Unit |
|---|---|---|
| $R_{th1}$ | $5.0 \times 10^{-2}$ | K/W |
| $R_{th2}$ | $1.1 \times 10^{0}$ | |
| $R_{th3}$ | $3.1 \times 10^{-1}$ | |

| Symbol | Value | Unit |
|---|---|---|
| $C_{th1}$ | $1.4 \times 10^{-3}$ | Ws/K |
| $C_{th2}$ | $8.5 \times 10^{-4}$ | |
| $C_{th3}$ | $1.1 \times 10^{-1}$ | |





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## ●Electrical characteristic curves

Fig.1 $V_F$ - $I_F$ Characteristics

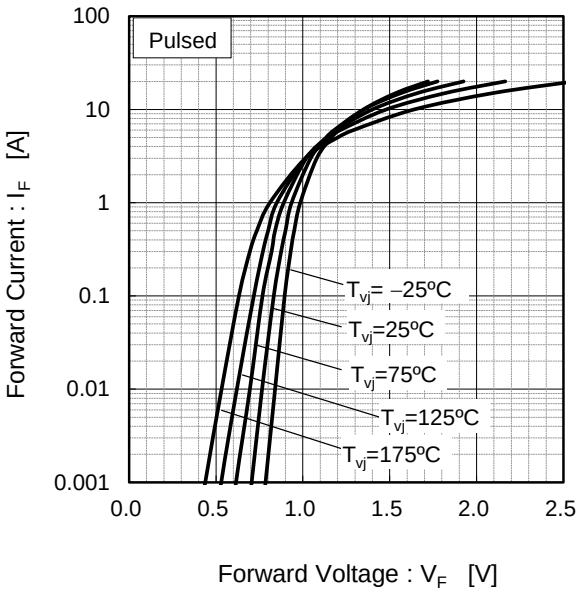



Fig.2 $V_F$ - $I_F$ Characteristics

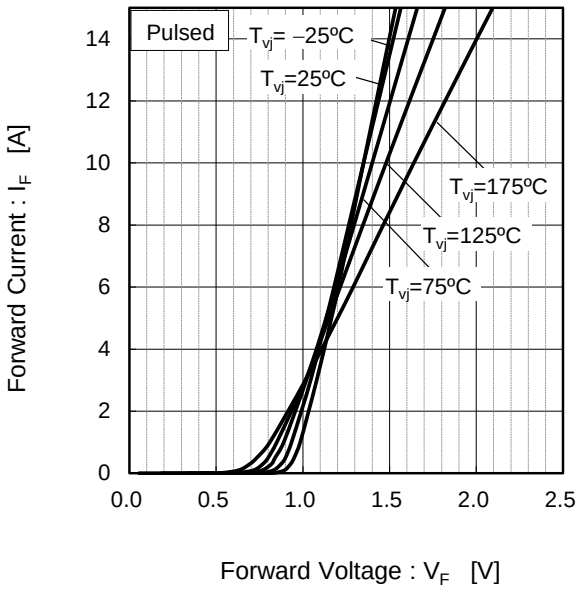



Fig.3 $V_R$ - $I_R$ Characteristics

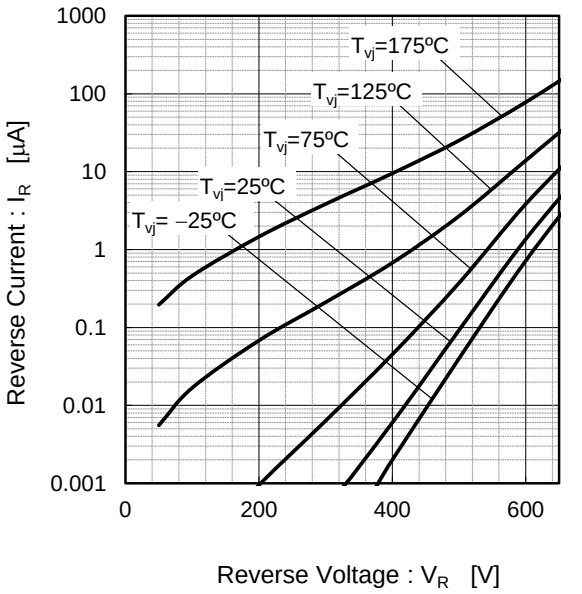
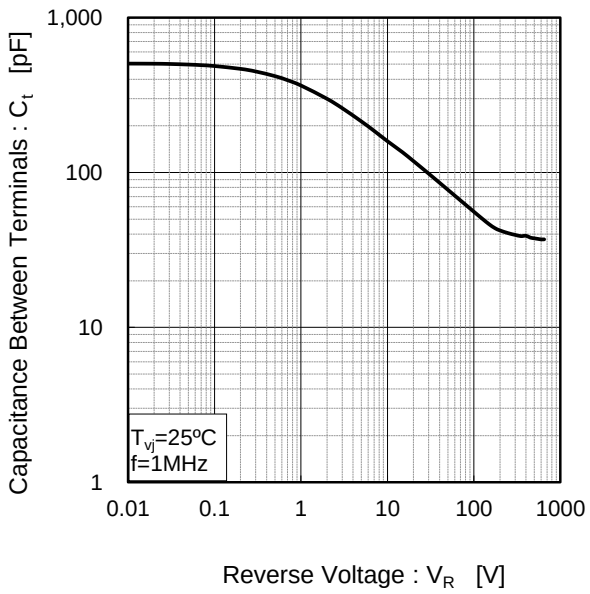



Fig.4 $V_R$-$C_t$ Characteristics





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## ●Electrical characteristic curves

Fig.5 Typical Transient Thermal Impedance vs. Pulse Width

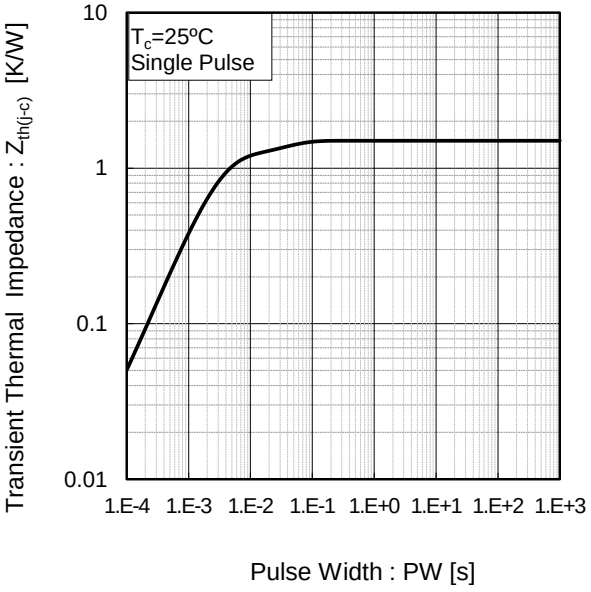



Fig.6 Power Dissipation

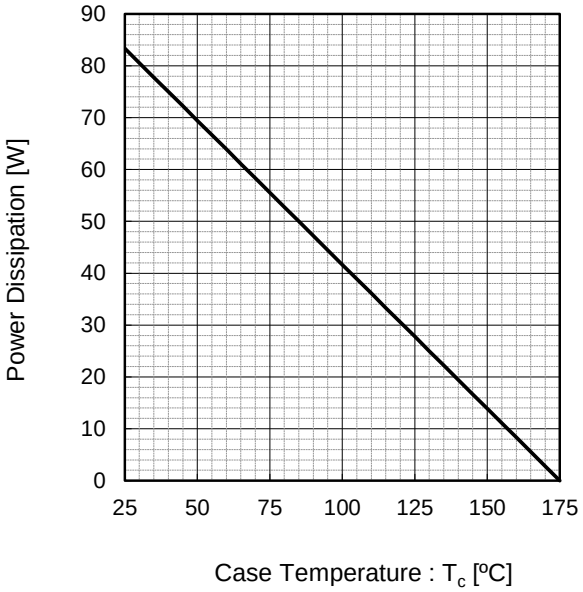
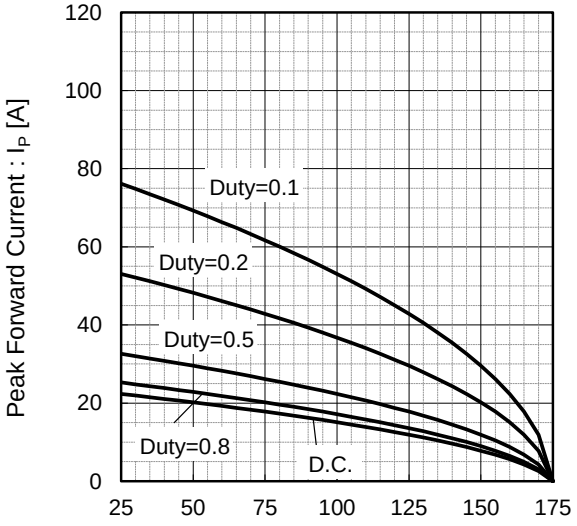
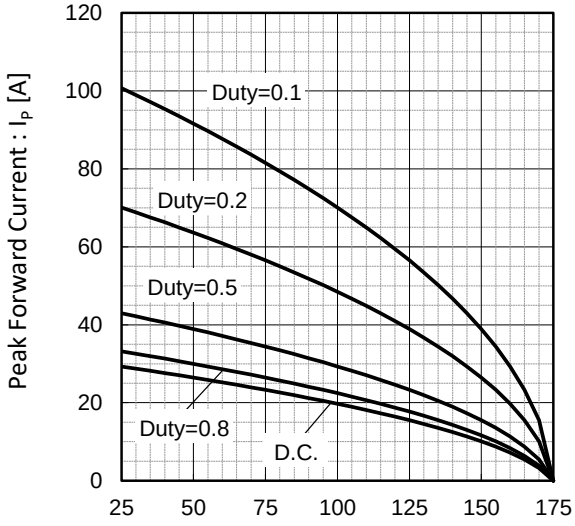



Fig.7*4 Maximum peak forward current derating curve $I_P$ - $T_c$




*4 Based on max Vf, max $Z_{th(j-c)}$
Valid for switching of above 10kHz, excluding D.C. curve.

Fig.8*5 Typical peak forward current derating curve $I_P$ - $T_c$ (Not guaranteed)




*5 Based on typ Vf, typ $Z_{th(j-c)}$
Typical value, not guaranteed
Valid for switching of above 10kHz, excluding D.C. curve


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## ●Electrical characteristic curves

Fig.9 Surge non-repetitive forward current vs. Pulse width (Sinusoidal waveform)

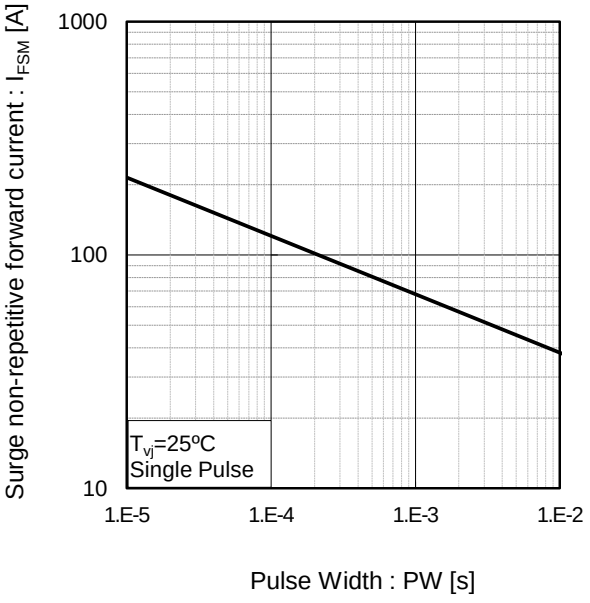
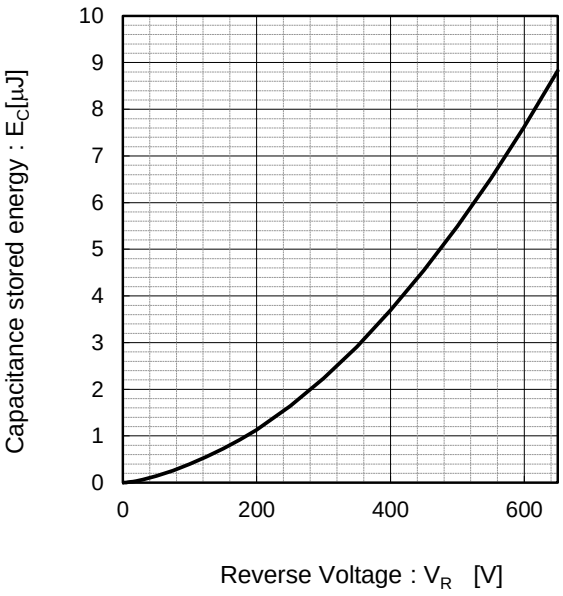
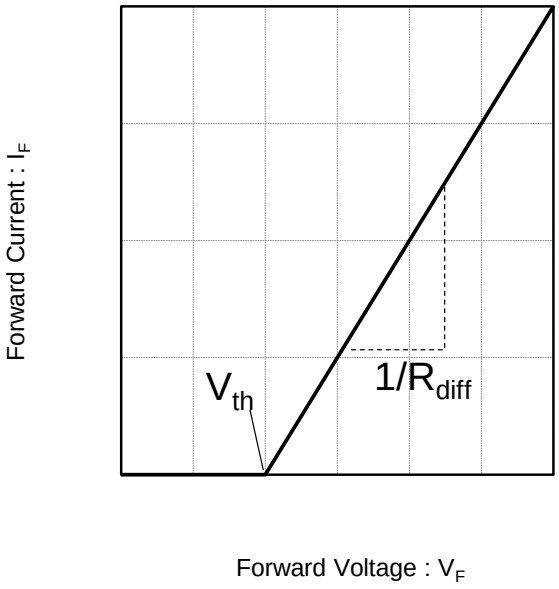



Fig.10 Typical capacitance store energy




## ●Symplified forward characteristic model

Fig.11 Equivalent forward current curve




$$V_F = V_{th} + R_{diff} I_F$$

$$V_{th}(T_{vj}) = a_0 + a_1 T_{vj}$$
$$R_{diff}(T_{vj}) = b_0 + b_1 T_{vj} + b_2 T_{vj}^2$$

| Symbol | Typical Value | Unit |
|---|---|---|
| $a_0$ | $9.4 \times 10^{-1}$ | V |
| $a_1$ | $-1.1 \times 10^{-3}$ | V/°C |
| $b_0$ | $4.0 \times 10^{-2}$ | Ω |
| $b_1$ | $1.0 \times 10^{-4}$ | Ω/°C |
| $b_2$ | $1.1 \times 10^{-6}$ | Ω/°C$^2$ |

$T_{vj}$ in ºC; -55 ºC < $T_{vj}$ < 175 ºC ; $I_F$ < 20 A


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